

#3

volume equipment.

Then you upload Joe's **digitized images** to your site on the Internet's World Wide Web - your own Web address would be something like **www.yourlab.com**. And you send Joe an e-mail message saying, 'Your photos are ready!'

From wherever he happens to be, Joe logs on to your Web site and types in his receipt number and password. Bingo! Up on his computer screen comes the online equivalent of an index print, showing miniature 'thumbnail' images of all the pictures in the roll. For each picture, Joe can download the **digital image** file into his computer, so he can use it in his word processor and print it out on his desktop printer. Just as easily, he can e-mail the **image** file to his friends. And he can write a caption for each photo, either a brief note or a long, detailed description, and the caption will stay attached to the **digital image**.

Best of all, from your point of view, he can **order prints** and enlargements. For each shot he likes, he just clicks on that **thumbnail image** and in a few seconds the photo appears on his screen, postcard-size. When he...

...all, when Joe and Jane Customer come up to your finishing counter and ask for Internet service, you want to say, 'Yes, we can do that.'

Because online delivery is a...

...you extra profits just like the add-ons you're used to - reprints, enlargements, poster **prints** and **photo** novelties like **photo** T-shirts, key chains and mugs.

Independent dealers and minilabs can get started by using...

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Photo play. (guide to image editing) (includes related articles on file format choices, resolution, fun projects to do with digitized photos) (Technology Information)
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ABSTRACT: A guide to digital technology for amateur photographers is presented. Existing photos can be readily converted into computer files either with an inexpensive scanner or through a service bureau. Professionally digitized photos are usually delivered compressed on a floppy disk; the user will need a lot of hard disk space to convert them to a standard file format. PictureWeb offers a service that stores **digitized** photos on the World Wide Web. Many photofinishers **digitize images** to Kodak Photo CD format, which offers very high resolution and color accuracy. Photo CD images can take up a lot of RAM, and the cost tends to be high; Photo CD is overkill for many hobbyists. Color scanners are now inexpensive and easy to use, and most flatbed scanners offer better resolution than low-cost scanning services. Storm Software's EasyPhoto Reader is an innovative scanner that scans snapshots only. **Digital** cameras let users create **digital images** directly, often for less than \$1,000. **Image**-editing software is a necessity; good products for hobbyists include Adobe's PhotoDeluxe and PictureWorks' PhotoEnhancer Plus.

TEXT:

Polish your images without breaking your budget.
Are your cherished photos hidden away in dusty albums?
Or, worse, piled up haphazardly in bulging shoe boxes? Well, drag them

out, dust them off, and get ready for a round of new products destined to turn your Mac into a low-cost photo shop.

The multibillion-dollar amateur-photography market has caught the attention of the computer industry, triggering an avalanche of new products and services focused on getting shutterbugs addicted to their computers. Using a variety of these products, we scanned, printed, downloaded, and edited our own photos and found that many of the products were affordable, easy to use, and fun.

You can start getting playful with your pictures by first converting them into computer files. You can do this either through one of the many new services that have been popping up recently or by means of new, inexpensive home hardware now on the market. Once your photos have been **digitized**, you can then use a range of **image**-editing programs to turn your Mac into a virtual darkroom.

The programs we tested let you perform a variety of alterations, from salvaging underexposed or poorly composed photos to going as far as editing out an ex-spouse whom you might want, so to speak, out of the picture. Edited photos can then be dropped into specialized project software and used for personalizing a variety of everyday objects, including calendars, coffee mugs, and greeting cards.

All this photo fun is open to most Mac users, even those with 68040-based Performas packing 8 MB of RAM. But those who might become frustrated occupy both ends of the spectrum. People with relatively anemic Macs (68030-based or less powerful ones) won't have the horsepower to manipulate photos at anything faster than a snail's pace. Graphics pros, who prize versatility and demand precision in their tools, will likely be underwhelmed by the hobbyist level of the affordable hardware and software we've chosen. If you and your CPU fall somewhere in between, get ready for some photo opps.

Step 1: Turn Pictures into Pixels

Getting color photos into your computer is cheaper and easier than ever. In the short run, the least expensive route is to have someone digitize your photos for you. You'll pay for each photo but won't have to cough up funds to purchase any input hardware.

However, if you need tight control over turnaround time, you may want to consider digitizing your photos yourself. After the initial outlay for a scanner or a digital camera, the cost per scan is nil.

Full Service

If you opt to take your pics to a shop for digitizing, you still have several methods to choose from, distinguishable chiefly by resolution (see the "Pixel Perfect" sidebar), price, turnaround time, and delivery medium. Many service providers digitize photos en masse, via an automated process. Some deliver the goods on floppies, others post the images online for downloading, and yet others burn them onto CDs.

Floppy Photos. Need a 24-exposure roll digitized? How does four bucks grab you -- for the whole roll? A few photofinishing companies now offer digitizing as an option with a regular developing and **printing order**. When you get your **prints** and negatives back, sometimes in as few as two days, the envelope also contains a floppy full of photos.

But be prepared to make room on your hard disk to accommodate these large image files. In order to work with the photos on-screen, you must copy the files to your hard disk, decompress them, and convert them to a standard file format, such as TIFF or PICT (see the "Saving Grace" sidebar), using a utility provided for free by the digitizing service.

Photos-on-floppy providers, such as Konica PictureShow, are often as close as the photo drop box at your local drugstore or grocery chain. If you can't find this service locally, check out a company that works via the mail, such as Seattle FilmWorks. You'll get your floppy back, chock-full o' pics, in about a week. When time is of the essence, you can shave off a few days by downloading your pictures from Seattle FilmWorks' **Web** page (<http://www.filmworks.com>) at no extra charge. If you're using a 28.8-kbps modem, download time for a 24-exposure roll runs roughly six to eight minutes.

The image quality of floppy-based photos is adequate for many

hobbyist-level projects, such as newsletters and personalized calendars. Konica images weigh in at 600 x 400 pixels; those by Seattle FilmWorks have a slightly higher resolution -- 640 x 480 pixels.

CyberStorage. Floppies don't last forever, and given that image files are notorious space hogs, your hard disk tends to fill up fast. One company, PictureWeb ([http:// www .pictureweb.com](http://www.pictureweb.com)), offers a solution: After digitizing your pictures, the company stores them for you on the Web . You and your designated friends can then punch in a private password to browse through your photos at any time. PictureWeb also maintains a limited site on America Online and will likely be offering full services there by the time you read this.

Beware, however: PictureWeb pages, especially those laden with a dozen thumbnails of your images, can take a minute or two to appear on your screen, even if you're using a 28.8-kbps modem. Click on a **thumbnail** to see a larger version of a selected **image** , and then download it if you want that **image** .

Besting the photos-on-floppy **digitizers** , PictureWeb offers several choices of format (JPEG, GIF), compression, and resolution (choose custom resolutions of up to 800 x 640 pixels) for downloading. Also, its top resolution choice beats out those provided by Konica PictureShow and Seattle FilmWorks. The download time for an image with the highest resolution and least amount of compression is about two minutes if you're using a 28.8-kbps modem; images with lower resolution and greater compression take less time.

Remember, however, that because PictureWeb stores images for you, you have to download only those you need for a project. The rest, as well as the originals of any images you download, stay safely in PictureWeb's **Web** space. You pay \$24 to store up to 100 **images** for a year.

PictureWeb charges \$28 to develop, print, and digitize a 24-exposure roll, but it plans to drop this price to \$12 by the time this article appears, bringing its fees in line with those of budget digitizers. (However, you'll still pay 99cents to have an individual print, slide, or negative digitized by PictureWeb.) It also plans to team up with mail-order firm Mystic Color Labs to offer online delivery of digitized photos to Mystic's clients.

CD Solution. If you're looking for the Rolls-Royce of mass-digitizing services, you'll find it in Kodak's Photo CD. Although many average storefront photofinishers offer Photo CD service, Photo CD images are of such high resolution that even graphics professionals use them in their work. Additionally, the images are permanently stored on a durable compact disc, sparing your hard disk.

Photo CD discs each hold about 100 photos, each of which appears in five resolutions. Three of the resolutions exceed those of photos-on-floppy digitizers (up to a whopping, RAM-choking 3,072 x 2,048 pixels). The maximum resolution is decidedly overkill for hobbyist projects, but because Photo CD images are equal in quality to those snapped on 35mm film, this storage method is ideal for archiving. Plus, you don't have to archive all your photos at the same time; you can store subsequent photos on partially filled discs at later dates.

Kodak also offers a variety of low- or no-cost utilities that streamline the use of Photo CD images, optimize color accuracy, and help manage image collections across many discs. You can also easily share your Photo CD discs with Microsoft Windows devotees.

Photo CD discs may sound like the perfect storage option, but there's a dark cloud for every silver lining. If you want to keep the processing cost for a 24-exposure roll under \$30, expect a two-week turnaround. If you need one-day turnaround, cough up roughly twice that and be sure to go to a photofinisher who processes Photo CD discs on-site. (Processing of an individual print or slide costs between \$1.50 and \$3.00.) To economize, have your film developed and printed traditionally and then select only your favorite photos to put on-disc.

Do It Yourself

If you get tired of shoveling money to digitized-photo providers, consider digitizing your photos yourself. Low-cost hardware can make it

happen -- with few hassles.

Scanners. Prices of color scanners have dropped, and the scanners have become easier to use. Standard flatbed scanners offer a scanning area with dimensions almost equal to those of legal-sized paper, so you can scan large as well as small photos. The maximum resolution you get from most flatbed scanners is greater than what you can get from budget scanning services, and the price is right. Scanners targeted at home users -- including offerings from La Cie, Hewlett-Packard, Apple, Epson, Microtek, and UMAX -- start at about \$400. In general, you pay more for scanners that offer higher resolution and sophisticated color-capture features.

Storm Software's EasyPhoto Reader offers an innovative twist on scanner technology. At about half the size of a shoe box, this diminutive gizmo is built to scan prints of up to 4 inches in width. Period. Unlike its flatbed brethren, the EasyPhoto Reader can't scan thick items such as books. Nor does it include sophisticated software for adjusting color values and image resolution before you scan. And you can forget about any optical-character-recognition capabilities.

Instead, the EasyPhoto Reader trades versatility for unparalleled ease of use and an attractive \$269 price. It connects via a serial port, so it's not part of a potentially fragile SCSI chain. Scanning is a one-touch operation: Stick your photo onto the tray, and press a button. The Reader grabs it, scans it, and spits it out. It requires no technical expertise on your part. Best of all, scans match the original image quite closely and the maximum **image** resolution, 200 dpi, tops that of **digital** cameras and budget **digitizers**.

Digital Cameras. Need the shortest-possible turnaround time? Bypass film entirely by capturing images digitally.

If your Mac has a video-in port, either built-in (as on the Power Mac 7500) or supplied via an add-in card, you can plug your family camcorder or VCR into your Mac and grab images from favorite videotapes. Or fork out \$99 for Connectix's QuickCam, a grayscale, no-frills digital-video camera that plugs into a standard serial port.

A more versatile solution, however, is to use one of the hot \$1,000-and-under color digital cameras. They offer autofocus and autoexposure, so they operate like traditional point-and-shoot cameras. **Digital** cameras' claim to fame: They have no film.

Instead, **images** are stored in the camera's built-in memory and can be transferred to your computer via a cable that connects the camera to your computer's modem or **printer** port. You can go from releasing the shutter to viewing your photos on-screen in literally minutes. Digital cameras generally offer you the same photo capabilities as low-cost point-and-shoot cameras, but film captures greater image detail, enabling you to pull off artistic close-up shots.

The low-end-digital-camera field is crowded these days, with entries from companies such as Casio, Apple, Chinon, and Kodak. Epson is working on one that's due out at about the time this article appears. In our informal tests, the Casio images, which have relatively low resolution, appeared grainier than most. Despite its hefty price tag of \$979 (estimated street), we especially liked Kodak's new DC50 Zoom model, which comes with a zoom lens and offers expandable storage via PC Cards (see review, May '96, page 44).

Step 2: Photo Finishing

Once your photos are digitized, the ugly truth may come out: Your pictures aren't perfect. Not everyone is an Ansel Adams or an Annie Leibowitz. Your pictures may be under- or overexposed, suffer from poor composition, or be plagued by the red-eye menace. Or heck, the photos may look fine artistically but you'd rather have Tyra Banks' or Jackie Chan's body instead of your own.

Fortunately, **image**-editing software gives you the means to enhance your **digitized** photos. Programs aimed at hobbyists sport low sticker prices as well as friendly interfaces.

You'll probably start using the programs for cosmetic touch-ups and simple formatting, such as rotating an image. If that's all you want to do, you might be content with the free file-conversion utilities that are

provided by Konica PictureShow and Seattle FilmWorks and that offer very rudimentary image-editing features.

Digital cameras usually come with more-substantial software. Apple PhotoFlash, which is bundled with Apple's QuickTake 150 camera, has particularly easy-to-use controls for straightening images, cropping, and removing scratches and dust. Kodak cameras include PictureWork's PhotoEnhancer; a beefier version is available as PhotoEnhancer Plus. Both versions win the ease-of-use prize when it comes to adjusting colors, contrast/brightness, focus, and exposure. Pull up the Filter By Example dialog box to adjust, for example, the yellow-to-blue range of color values. PhotoEnhancer (as well as PhotoEnhancer Plus) then displays a section of your image repeated nine times, with varying levels of color, ranging from mostly yellow to a dominant blue cast. Double-click on the image you like the best, and the adjustment is complete.

Many of the budget image editors, including PhotoEnhancer Plus, let you make more-drastic changes. Others in this category are Microfrontier's ColorIt!; Microspot's PhotoFix; and MacSoft's PhotoMaker, which is actually a limited version of ColorIt!. All sport a large image-editing area with a menu up top and a floating toolbox.

Another program, Adobe PhotoDeluxe, offers many of the features and tools common to image-editing programs, but its approach redefines simplicity. Instead of having an image area flanked by a tool bar and menu bar, PhotoDeluxe arranges file-folder-like tabs across the top of the screen. Click on the tabs to uncover step-by-step instructions for adjusting image brightness, color balance, and more. There's also guidance for slightly-more-involved alterations, such as replacing the background of one photo with that of another, putting your head on the body of someone or something else, removing red-eye, and applying special-effects filters.

A variety of handy tools populates the average image-editing program's toolbox. Use the pencil tool to draw arrows pointing to a particular location in a photo (the grassy knoll?) or to add an inscription in your very own handwriting. Spray-paint over a busy background, or whip out the paintbrush to see what your house would look like in a different color.

It's the specialized image-editing tools, however, that can be the most fun to use. Clone tools, for example, help you cover unwanted parts of an image, such as ugly telephone wires, by letting you "paint" with colors and patterns you pick up from other areas of the image. Another convenient tool, the magic wand, enables you to select a contiguous patch of color with a single mouse click. This sure beats painstakingly outlining a section of sky you want to brighten or tracing around a head of hair you want to recolor.

Once you've mastered some of the more specialized tools, you can play with some creative cutting and pasting. Drop sections of one image into another image, creating scenes that never existed in real life. Seat yourself next to Brad Pitt, share a joke with President Clinton, or circle the globe in the space shuttle -- all on your Macintosh screen.

All the programs we used also offer funky special-effects filters. Some filters let you trace the edges of an image in black, making a sort of coloring-book version of the image. Another filter creates an embossed look. Just select a filter from a menu when your photo is open, and the program will apply the change. If your software doesn't come with the filter you're looking for, try using a set of third-party plug-ins, such as KPT Cool Effects, by MetaTools. Plug-ins, most of which are collections of filters designed to work with Photoshop, can be used with nearly all the image-editing programs mentioned in this article, excluding both versions of PhotoEnhancer.

Step 3: Make Arts into Crafts

Edited digital photographs are the raw material for a host of fun projects. Drop them into a word processor, such as Microsoft Word, or a page-layout program, such as Adobe PageMaker, to create eye-catching For Sale signs, missing-dog posters, real-estate flyers, or family newsletters.

Painless Projects. Don't have the time or skill to design layouts? Check out specialized software. One of the image editors -- Adobe PhotoDeluxe -- doubles as a project generator. PhotoDeluxe not only guides

you through enhancing an image but also provides tab-based step-by-step instructions for completing projects with photos. Projects include colorful calendars, greeting cards, funny money, flyers, signs, and fake magazine covers.

Broderbund's PrintShop Deluxe CD Ensemble offers templates for creating posters, banners, greeting cards, business cards, and postcards, all of which can be made more personal when illustrated with photographs. Compared to PhotoDeluxe, PrintShop offers fewer projects that are specifically designed to incorporate photographs, but you can customize the terrific collection of templates and enhance them with PrintShop's ample supply of clip art.

If none of these programs has that esoteric greeting-card layout you need, you might find it in Mindscape's CardShop Plus, which offers card layouts, clip art, and suggested text appropriate for birthday, St. Patrick's Day, and get-well cards and a host of others. The interface is a bit confusing, however, making the program harder than necessary to master.

If you're not keen on making customized cards and calendars but would just like to get all those old photos out of their overloaded shoe boxes, you can use ProView's E-magine to create a digital photo album. This simple program lets you fill album pages with photos as well as with sounds and movies. You can view the pages in sequence, as a kind of slide show, or click on "hot areas" that you can set and that let you jump to preselected pages. The beauty of this program is how easy it is to use -- you can create an album in minutes.

Image Producers. For projects that require color output, check out the under-\$500 inkjet printers, including those from Apple, Epson, and Hewlett-Packard. If you want higher-quality or larger-sized output than what desktop printers can produce, consider bringing your files to a service bureau (check in the Yellow Pages under Desktop Publishing). For photographic-quality prints, ask for output on a dye-sublimation **printer**, which offers a richly colored, lustrous finish similar to that of a glossy photograph.

The dye-sub printers at service bureaus can output **images** with dimensions as large as 12 x 18 inches, but if you want photographic-quality prints you can store in your wallet, take a look at Fargo Electronics' FotoFun! dye-sub **printer**. Ideal for home users, this shoe-box-sized \$499 **printer** is so easy to install and use that in less than ten minutes, you'll be printing your kid's best baby pictures to **send** to grandma. Maximum output size is 4 x 6 inches, and you have to use special paper and dye ribbons available through Fargo.

For about \$40 more, you can buy companion kits from Fargo that let you print onto label or postcard media (36 prints apiece). An additional kit, also for \$40, includes materials that let you transfer **photos** to four coffee mugs -- it's as easy as **printing** an **image**, securing it to a supplied mug, and then baking the mug for 15 minutes. The results are impressive; the image is permanently fused to the mug, appearing as clear, sharp, and colorful as the original print.

The Big Picture

Using photos -- your own photos -- in everyday projects is easier than ever and is no longer the exclusive purview of graphics professionals. New services and products offer myriad ways to **digitize** and manipulate **images**, at prices well within the reach of most hobbyists. And there's certainly no shortage of ways to use the images. So go ahead and, er, develop your photographic talents. There are no negatives: It's a snap.

Shelley Cryan is a MacUser contributing writer with a photographic memory. Unfortunately, it doesn't always develop.

Just a Click Away: PhotoEnhancer, and its beefier sibling, PhotoEnhancer Plus, provide a quick and easy way to fine-tune your images. Here, you'd just look over the color choices that were presented to you and click on the one you liked best.

Presto Chango: Your friends may think you slaved all day stylizing your image, but you know that it took only one or two mouse clicks in your image-editing program. Just pick your favorite special-effects filter, and watch as your image goes from ho-hum (A) to artsy (B). Many image-editing

programs also accept third-party add-on filters, such as those provided in KPT Cool Effects, from MetaTools (C).

Saving Grace: In a TIFF over file-format choices?

When saving images to disk, you need to decide on a file format. Sometimes you may not have a choice -- the program in which you plan to use your images may accept only a certain format -- but usually you've got some latitude. Also, some formats offer compression options, which make it easier to fit images on floppies and conserve hard-disk space. Here are some common formats and compression schemes:

EPS

(Encapsulated PostScript)

EPS is the only format that supports the use of clipping paths, which allow you to create irregularly shaped images, as opposed to only rectangular and square ones. However, stick with the TIFF or PICT formats if your final output will be to a non-PostScript **printer**.

GIF

(Graphic Interchange Format)

If you plan to post your **images** online, GIF is a smart bet, because its relatively small file size allows **images** to **transmit** quickly over the **Internet**. This format is a poor choice for most other uses, however; because GIF files are limited to 256 colors, details and color quality suffer.

JPEG

(Joint Photographic Experts Group)

Because of its very small file sizes, the JPEG format is another good choice for images transferred via modem or for those crammed onto a floppy disk. JPEG is actually a compression scheme that throws away data to save space -- called a "lossy" scheme -- so you'll notice image degradation if you opt for a high level of compression. At lower levels of compression, however, picture quality remains accurate.

PICT

(not an acronym)

Files in this very common bitmapped format are often used for on-screen presentations, because of their relatively small size. Avoid using PICT as a file format if you need to color-separate your output or if the image contains PostScript text or graphics--with PICT, what you see on-screen is not always what you get on paper.

TIFF

(Tagged Image File Format)

Images in this format are high-resolution and bitmapped. As a rule of thumb, TIFF files work well for the **printing** and on-screen display of photographic **images**. You can reduce the size of TIFF files by using the LZW (Lempel-Ziv-Welch) compression scheme, which some programs may offer as an option. Unlike other types of compression, LZW maintains image quality through a so-called "lossless" scheme, which compresses images without throwing away any data.

Pixel Perfect: Focus in on resolution

Be you amateur or professional, if you're going to be working with photos on your computer, you should understand the costs and effects of resolution. Images with high resolution show off sharp details but also take up more space on your hard disk than low-resolution, less visually exact **images**. They also usually cost more to **digitize**. In order to save yourself some time, money, and hard-disk space, you should figure out the resolution you really need for your project.

But before you can do this, you'll probably want to understand the ways of measuring resolution. When you're using digitizing services or digital cameras, you'll find resolution expressed in terms of pixel dimensions, which measure the long and short sides of a rectangular **image**. Seattle FilmWorks' **digitizing** service and the Apple QuickTake 150 camera, for example, both provide images at a 640-x-480-pixel resolution.

If you're working with scanners, on the other hand, you'll usually hear about resolution in terms of dots per inch, or dpi. Storm Software's EasyPhoto Reader, for example, maxes out at 200 dpi, which is considered on the low end of today's scanner capabilities.

To compare dpi with pixel dimensions, multiply your photo's original measurements by the photo's scanning resolution to get the total number of pixels for each dimension. A 4-x-6-inch print scanned at 200 dpi would measure 800 x 1,200 pixels. Work backward to figure out dpi from pixel dimensions. Crank through the mathematics, and you'll quickly see that even the lowest-resolution desktop scanners can provide higher-resolution **images** than most value-priced **digitizing** services or **digital** cameras -- as long as your scanned print is at least 4 x 6 inches.

But will your digitizer of choice provide the resolution you need? More to the point, what resolution do you need? Pick one that's too low, and you'll get jagged, coarse images. Pick one that's too high, and your Mac may not have enough RAM to handle it. Even if it does, an image with a higher resolution than you need will cause your computer and **printer** to grind away needlessly, and you'll waste hard-disk space storing mammoth files. A 640-x-480-pixel color image takes up just under 1 MB, for example, and a 1,200-x-1,800-pixel color image occupies more than 6 MB.

The resolution you need depends on your final output. If you are a hobbyist, final output is most likely on either your screen or a color inkjet **printer**. If you plan to output to screen, you'll need to scan your image at your monitor's resolution. You can find out your monitor's pixel resolution by clicking on the Options button in the Monitors control panel.

However, if you plan to print to a desktop color inkjet **printer**, you'll probably need a higher resolution. Say you've got a 360-dpi color inkjet **printer** and you want to use it to print a photographic **image**. Scan the photograph at 360 dpi, right? Wrong. That'd be too easy.

The bad news is that **printer** resolutions aren't equal to scanning resolutions. The good news is that it's easy to figure out what you need. Here's a handy tip: To figure out the scanning resolution needed, divide the **printer**'s resolution by 3. You'll see that your 360-dpi color inkjet **printer** can make use of the information in a 120-dpi scanned image. (FYI, according to our handy math, a 4-x-6-inch image scanned at 120 dpi will have a resolution of 480 x 720 pixels.) There's some leeway, so experiment a bit to find the resolution that looks best to your eye. You may find you can get away with a somewhat lower-resolution image, but increasing the resolution drastically isn't going to improve the image quality.

The bottom line? If you're outputting to screen or to a low-end inkjet **printer**, a budget scan or a low-end digital camera will provide ample resolution -- much of the time. But there's a catch. The math works only if you're using your images at their original size or smaller. If you plan to enlarge your images, you'll benefit from the higher resolution attainable from scanners, service bureaus, and Photo CD.

Say you've got a budget scan of a group shot taken from afar and you want to isolate and enlarge one of the faces to decorate the front of a card. When you blow up the face, however, the image becomes jagged and blurry. Why? Because the pixels that comprise the face are now spread over a larger area, effectively reducing the dots per inch (think of how images printed on a balloon get grainier as you blow up the balloon).

In effect, you need to start out with a higher resolution to end up at your target resolution for the final, enlarged image. This is when you'll need to seek out higher-resolution options, because **images** from low-end **digital** cameras and photos-on-floppy providers will fail you.

Photo Fun

4 photo projects in under an hour apiece

You've digitized your favorite photos, rubbed out the red-eye, and fooled around with a slew of special effects. But where do you go from there? If you're short on creative ideas for outputting your artwork, take a look at the following four projects to get ideas for personalizing flyers, calendars, coffee cups, and postcards--each in under an hour.

Project: Real-Estate Flyer

Tools: **Image** -editing software, Adobe PhotoDeluxe

Step 1: **Digitize** a photo of a property, using one of the many options mentioned in the main article. Then convert the image to a TIFF file. (Shown here is the image we used.)

Step 2: Open your file in an image-editing application such as

PhotoEnhancer Plus, in which you can crop and touch up your image. We used the clone tool to paint over the antenna on the roof and also to remove the traffic sign that blocked part of the house's front door.

Step 3: Open your image in PhotoDeluxe, and select the Flyer icon, which brings up step-by-step instructions for creating flyers. Early on, you should choose a template and establish placeholders over which you can add the photo and descriptive text. In our example, the For Sale headline was already in place and colored, as was the background gradient. The flyer is now ready for output on a color inkjet **printer**.

Project: Calendar

Tools: The PrintShop Deluxe CD Ensemble, **image** -editing software (optional)

Step 1: If necessary, touch up your photo with an image-editing program. You might want to crop it, replace the background, or remove unwanted items.

Step 2: After launching PrintShop Deluxe, you'll see a handful of project options. Select Calendar. Succeeding screens will ask you to specify your calendar's dates and either a wide or tall orientation.

Step 3: Next, you're asked to select from among dozens of backgrounds and then from a handful of layouts. Make sure you pick a layout that leaves enough room for a photo -- not all of them do.

Step 4: PrintShop Deluxe creates the calendar to your specifications. After the calendar appears on-screen, select File Import to pull in your favorite photo (PICT or EPS format only). Position and/or resize the photo. If you like, add text and graphics to highlight important dates. Then you're ready to print!

Project: **Photo Mug**

Tools: **Image** -editing software, Fargo FotoFun! **printer**, Fargo Mug Kit

Step 1: Use an **image** -editing application such as ColorIt! to touch up your original photo. In our example (left), we cropped and resized the image to fit on a mug. We then used the clone tool to paint over dust spots and to create a more festive effect by replacing the ugly lamp in the background with Christmas-tree branches. We also fixed the children's red-eye problem by selecting the red pupils with the magic-wand tool and then pouring in black paint with the paint-bucket tool. Finally, we used the text tool to write 1995 (right).

Step 2: Print your **image** on the Fargo FotoFun! dye-sub **printer**, using the **printer** settings recommended for coffee-mug transfers.

Step 3: Secure your printout to a supplied coffee mug, using tape and the special clamp. Bake the mug in an oven for 15 minutes, and cool it in warm water for 2 minutes. Then remove the clamp, tape, and print, and your mug will be ready for a hot cup of coffee.

Step 4: We selected the Brightness icon and lightened the darker parts of the horse -- the neck, legs, and tail -- to make them easier to see. We then clicked on the Text icon to add text and a drop shadow for the text (see below).

Step 5: We printed the file on the Fargo FotoFun! dye-sub **printer**, using paper supplied in Fargo's postcard kit. The final product was a glossy, photograph-quality postcard suitable for mailing.

Project: Postcard

Tools: Adobe PhotoDeluxe, Fargo FotoFun! **printer**, Fargo Postcard Kit

Step 1: Our original photograph of the carousel horse was unimpressive, especially with the red fence marring the composition. We saved an extra copy of the image.

Step 2: We selected PhotoDeluxe's Motion filter to distort the image and to add the illusion of motion to the horse.

Step 3: We returned to the copy of the original photo and clicked on the Change Background icon. PhotoDeluxe then stepped us through the isolation of the horse that we wanted to keep and its placement in the photo we had distorted with the motion filter.

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SPECIAL FEATURES: illustration; other

DESCRIPTORS: Technology Overview; Image Processing Software; Image Scanner
FILE SEGMENT: CD File 275

...ABSTRACT: space to convert them to a standard file format. PictureWeb offers a service that stores **digitized** photos on the World Wide **Web**. Many photofinishers **digitize images** to Kodak Photo CD format, which offers very high resolution and color accuracy. Photo CD...

...scanning services. Storm Software's EasyPhoto Reader is an innovative scanner that scans snapshots only. **Digital** cameras let users create **digital images** directly, often for less than \$1,000. **Image** -editing software is a necessity; good products for hobbyists include Adobe's PhotoDeluxe and PictureWorks...

... means of new, inexpensive home hardware now on the market. Once your photos have been **digitized**, you can then use a range of **image** -editing programs to turn your Mac into a virtual darkroom.

The programs we tested let...

...A few photofinishing companies now offer digitizing as an option with a regular developing and **printing order**. When you get your **prints** and negatives back, sometimes in as few as two days, the envelope also contains a...

...essence, you can shave off a few days by downloading your pictures from Seattle FilmWorks' **Web** page ([http:// www .filmworks.com](http://www.filmworks.com)) at no extra charge. If you're using a 28.8-kbps modem...

...notorious space hogs, your hard disk tends to fill up fast. One company, PictureWeb ([http:// www .pictureweb.com](http://www.pictureweb.com)), offers a solution: After digitizing your pictures, the company stores them for you on the **Web**. You and your designated friends can then punch in a private password to browse through...

...your screen, even if you're using a 28.8-kbps modem. Click on a **thumbnail** to see a larger version of a selected **image**, and then download it if you want that **image**.

Besting the photos-on-floppy **digitizers**, PictureWeb offers several choices of format (JPEG, GIF), compression, and resolution (choose custom resolutions of...as well as the originals of any images you download, stay safely in PictureWeb's **Web** space. You pay \$24 to store up to 100 **images** for a year.

PictureWeb charges \$28 to develop, print, and **digitize** a 24-exposure roll, but it plans to drop this price to \$12 by the...

...your part. Best of all, scans match the original image quite closely and the maximum **image** resolution, 200 dpi, tops that of **digital** cameras and budget **digitizers**.

Digital Cameras. Need the shortest-possible turnaround time? Bypass film entirely by capturing images digitally...

...cameras. They offer autofocus and autoexposure, so they operate like traditional point-and-shoot cameras. **Digital** cameras' claim to fame: They have no film.

Instead, **images** are stored in the camera's built-in memory and can be transferred to your computer via a cable that connects the camera to your computer's modem or **printer** port. You can go from releasing the shutter to viewing your photos on-screen in...d rather have Tyra Banks' or Jackie Chan's body instead of your own.

Fortunately, **image** -editing software gives you the means to enhance your **digitized** photos. Programs aimed at hobbyists sport low sticker prices as well as friendly interfaces.

You...

...utilities that are provided by Konica PictureShow and Seattle FilmWorks and that offer very rudimentary **image** -editing features.

Digital cameras usually come with more-substantial software. Apple PhotoFlash, which is bundled with Apple's...Pages under Desktop Publishing). For photographic-quality prints, ask for output on a dye-sublimation **printer** , which offers a richly colored, lustrous finish similar to that of a glossy photograph.

The dye-sub printers at service bureaus can output **images** with dimensions as large as 12 x 18 inches, but if you want photographic-quality ...

...you can store in your wallet, take a look at Fargo Electronics' FotoFun! dye-sub **printer** . Ideal for home users, this shoe-box-sized \$499 **printer** is so easy to install and use that in less than ten minutes, you'll be printing your kid's best baby pictures to **send** to grandma. Maximum output size is 4 x 6 inches, and you have to use...

...36 prints apiece). An additional kit, also for \$40, includes materials that let you transfer **photos** to four coffee mugs -- it's as easy as **printing** an **image** , securing it to a supplied mug, and then baking the mug for 15 minutes. The...

...longer the exclusive purview of graphics professionals. New services and products offer myriad ways to **digitize** and manipulate **images** , at prices well within the reach of most hobbyists. And there's certainly no shortage ...

...the TIFF or PICT formats if your final output will be to a non-PostScript **printer** .

GIF

(Graphic Interchange Format)

If you plan to post your **images** online, GIF is a smart bet, because its relatively small file size allows **images** to **transmit** quickly over the **Internet** . This format is a poor choice for most other uses, however; because GIF files are...

...high-resolution and bitmapped. As a rule of thumb, TIFF files work well for the **printing** and on-screen display of photographic **images** . You can reduce the size of TIFF files by using the LZW (Lempel-Ziv-Welch) ...also take up more space on your hard disk than low-resolution, less visually exact **images** . They also usually cost more to **digitize** . In order to save yourself some time, money, and hard-disk space, you should figure...

...in terms of pixel dimensions, which measure the long and short sides of a rectangular **image** . Seattle FilmWorks' **digitizing** service and the Apple QuickTake 150 camera, for example, both provide images at a 640...

...you'll quickly see that even the lowest-resolution desktop scanners can provide higher-resolution **images** than most value-priced **digitizing** services or **digital** cameras -- as long as your scanned print is at least 4 x 6 inches.

But...

...does, an image with a higher resolution than you need will cause your computer and **printer** to grind away needlessly, and you'll waste hard-disk space storing mammoth files. A...

...a hobbyist, final output is most likely on either your screen or a color inkjet **printer** . If you plan to output to screen, you'll need to scan your image at...

...the Monitors control panel.

However, if you plan to print to a desktop color inkjet **printer** , you'll probably need a higher resolution. Say you've got a 360-dpi color inkjet **printer** and you want to use it to print a photographic **image** . Scan the photograph at 360 dpi, right? Wrong. That'd be too easy.

The bad news is that **printer** resolutions aren't equal to scanning resolutions. The good news is that it's easy...

...need. Here's a handy tip: To figure out the scanning resolution needed, divide the **printer** 's resolution by 3. You'll see that your 360-dpi color inkjet **printer** can make use of the information in a 120-dpi scanned image. (FYI, according to...

...The bottom line? If you're outputting to screen or to a low-end inkjet **printer** , a budget scan or a low-end digital camera will provide ample resolution -- much of...

...enlarged image. This is when you'll need to seek out higher-resolution options, because **images** from low-end **digital** cameras and photos-on-floppy providers will fail you.

Photo Fun

4 photo projects in...

...calendars, coffee cups, and postcards--each in under an hour.

Project: Real-Estate Flyer

Tools: **Image** -editing software, Adobe PhotoDeluxe

Step 1: **Digitize** a photo ...was the background gradient. The flyer is now ready for output on a color inkjet **printer** .

Project: Calendar

Tools: The PrintShop Deluxe CD Ensemble, **image** -editing software (optional)

Step 1: If necessary, touch up your photo with an image-editing...

...add text and graphics to highlight important dates. Then you're ready to print!

Project: **Photo** Mug

Tools: **Image** -editing software, Fargo FotoFun! **printer** , Fargo Mug Kit

Step 1: Use an **image** -editing application such as ColorIt! to touch up your original photo. In our example (left...

...tool. Finally, we used the text tool to write 1995 (right).

Step 2: Print your **image** on the Fargo FotoFun! dye-sub **printer** , using the **printer** settings recommended for coffee-mug transfers.

Step 3: Secure your printout to a supplied coffee...

...text (see below).

Step 5: We printed the file on the Fargo FotoFun! dye-sub **printer** , using paper supplied in Fargo's postcard kit. The final product was a glossy, photograph-quality postcard suitable for mailing.

Project: Postcard

Tools: Adobe PhotoDeluxe, Fargo FotoFun! **printer** , Fargo Postcard Kit

Step 1: Our original photograph of the carousel horse was unimpressive, especially...

36/9,K/4 (Item 2 from file: 275)

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